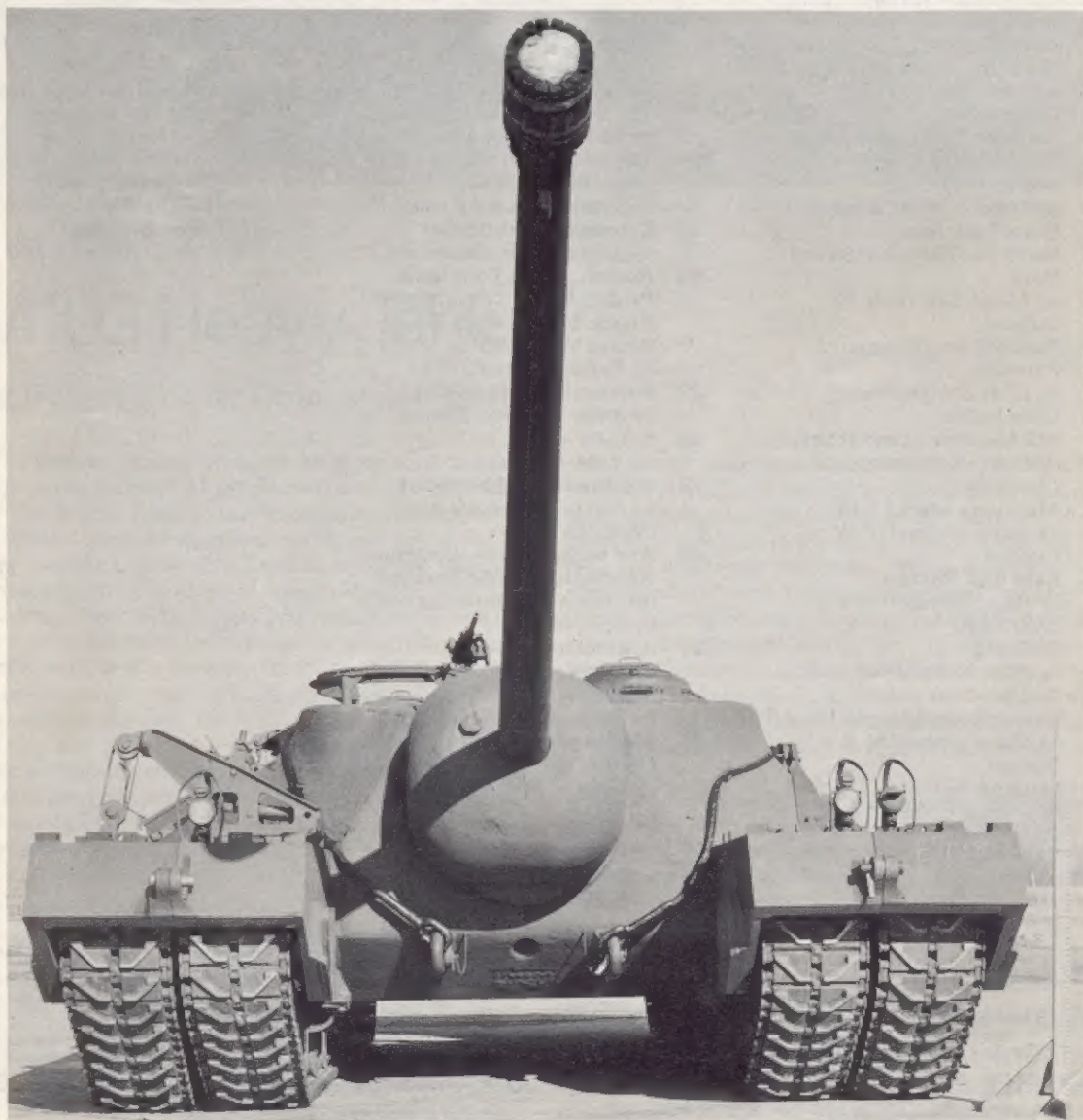


M103 Heavy Tank + M41 Light Tank (Walker Bulldog)

by Colonel Robert J. Icks



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T43E1 Heavy Tank was standardized as the M103 shown here with a T48 Medium Tank in the background. (Courtesy Chrysler Corporation)

M103 Heavy Tank

by Robert J. Icks, Colonel A.U.S. Retd.

THE problem of assaulting the Siegfried Line loomed large in the minds of Allied planners during World War II. The British Tortoise was intended as one means of breaching these fortifications but it was not ready in time. But the U.S. M4A3E2 makeshift assault tank did materialize in time to be of some assistance. And the discovery that cavities could be induced in the dragon teeth of the fortifications by the use of artillery fire was of even greater help in reducing these once-believed almost impregnable anti-tank defenses. Yet, until the time that this was determined, the U.S. Ordnance Department already had several heavy tank projects under way, in spite of disclaimers of interest in a heavy tank on the part of the Armored Command. These were in addition to the series which culminated in the M26 or Pershing, initially considered to be a heavy tank.

T28

The first of these projects was the T28, completed late in 1945 but first publicly shown late in 1946. The T28 actually was a glorified assault gun. Indeed, its designation was later changed to the T95 Gun Motor Carriage. Still later, however, on the occasion of its first public showing, it was again referred to as the T28 Heavy Tank.

The T28 utilized some M26 tank components and

some of the suspension components of the M4A3E8 Medium Tank. There were eight road wheels in pairs and three support rollers on either side. But there was also a supplementary track frame which duplicated the suspension and which was removable. When removed, these supplementary track units were fastened together to form a trailer which could be towed behind the tank. The vehicle was narrowed in this way for railroad travel, while for combat the added track width aided greatly in traction and flotation. Each track was 19½ inches wide with 6 inch pitch and had 102 track shoes. Two hydraulic winches made possible the handling of these heavy track units.

The T28 weighed 90.3 short tons empty and 95 short tons loaded. Frontal armor above the fenders was 12 inches at 0° with the mantlet being 11½ inches. Below the fenders the armor was from 6 to 8 inches thick at 0°. Armor on the sides was 2½ inches at 57½°. The skirts on the supplementary track frames were 4 inches thick. The hull was a combination of cast and rolled plate.

The huge gun mantlet housed a 105mm T5E1 1/67 gun having 10° right and 10° left traverse with elevation from -5° to 19°30'. For travel, the gun was locked at maximum elevation. One caliber .50 machine-gun was carried on the top deck. Ammunition supply was 62 rounds of 105mm ammunition and 660 of .50 caliber ammunition.

The engine was a Ford GAF V-8 of 410 hp at 2600 rpm operating through a torquatic transmission and controlled differential. Being badly underpowered it had a speed of only 8 mph and a radius of action of 100 miles. It carried a crew of four.

Five T28 tanks were ordered but only two were completed and one of them burned up during test. The other was broken up for scrap during the Korean War. But it had been obsolete before that in favor of the T29 Heavy Tank which mounted the same gun in a rotating turret.

T29

Construction of pilots of the T29 were approved on August 20, 1945. The T29 weighed 69 short tons loaded and 65 short tons empty and carried a crew of six. Hull armor was 4 inches at 54° in front except for the turret armor in front which was 7 inches at 0°. Hull sides were 3 inches at 0° and turret sides were from 4 to 5 inches at 0°. The gun was the 105mm T5E2 in a T123 combination mount giving an elevation of -10° to +15°. There were two .50 caliber coaxial machine-guns, a .30 caliber bow gun and a .50 caliber AA gun. Ammunition carried was 63 rounds for the main armament, 2500 for the .50 caliber and 2420 rounds for the .30 caliber machine-guns.

The T29 was powered by a Ford GAC V-12 650 hp at 2800 rpm engine through a cross drive transmission which permitted pivot turns. Maximum speed was 22 mph. The suspension was torsion bar. Tracks were 23 inch with extended end connectors which brought them to 28 inches wide. Pitch was 6 inches. There were eight road wheels and seven support rollers on either side and 102 shoes made up each track.

Various modifications were made. The T29E1 substituted an Allison V-12 engine for the Ford engine, the T29E2 had turret differences and an MIT stabilizer while the T29E3 was fitted with a rangefinder.

The original contract was made with Pressed Steel Car Company, the firm which had also contracted to build the T30 Heavy Tank and the T34 Heavy Tank. But with the end of the war the contracts were transferred to the Chrysler Corporation and the vehicles were completed at the U.S. Tank Arsenal at Warren, Michigan.

T30 AND T34

Like the T29, the T30 and the T34 had eight road wheels and seven support rollers on either side and were generally identical except for turrets and armament. The T30 was armed with a 155mm T7 gun in a T24 mount with one .50 caliber coaxial machine-gun. There was a .30 caliber bow gun and a .50 caliber AA gun. A power rammer and power hoist were provided for the separate loading ammunition. A 1500 cfm ventilating fan was provided. This kept the turret air pressure at a point which prevented burned powder fumes from entering when the breech block opened after firing. Sixteen rounds of 155mm ammunition were carried in the turret and 18 more in the hull, in addition to 2500 rounds of .50 caliber and 2200 rounds of .30 caliber ammunition. The T30 weighed 70 short tons loaded and 65 short tons empty and carried a crew of six.

The original Ford engine was changed to a Continental AV 1790-3 V-12 engine of 810 hp at 2800 rpm. One vehicle became the T30E1 mounting a 120mm gun with power rammer which indexed, loaded, and rammed the round and ejected the spent case hydraulically.

Twelve T30 vehicles were ordered but two of them became the T34. These were armed with the 120mm T53 gun having two coaxial .50 caliber machine-guns, a .30 caliber bow gun and a .30 caliber AA gun.

T32

The T32 was another heavy tank, recognizable by the suspension which had seven road wheels and six support rollers. It weighed 62.5 short tons loaded and 60 short tons empty. It was armed with a 90mm T15E2 gun on a T119 combination mount with a .30 caliber machine-gun. The bow machine-gun was .30 caliber and the AA gun was .50 caliber. Ammunition supply was 54 rounds of 90mm, 550 rounds of .50 caliber and 5000 rounds of .30 caliber. Armor maximum thickness was 11½ inches basis with actual frontal armor being 5 inches at 54°.

Five men made up the crew. The 264 U.S. gallons of fuel were sufficient for only a 75 mile cruising radius. A cross drive transmission was used with the Ford GAC V-12 engine of 750 hp at 2800 rpm. The tracks were steel chevron type 23 inches wide with extended end connectors, making the total width 28 inches. The suspension was torsion bar.

There was also a T32E1 which had a number of minor changes, principally in fire control.

T43E1 STANDARDIZED AS M103

The Berlin airlift and the beginning of the so-called Cold War placed new emphasis on the U.S. postwar tank program as a whole. The result was the emergence of three basic designs, the T41 Light Tank, the T42 Medium Tank and the T43 Heavy Tank. The basic design of the T43 resulted from the experience gained with the T28, T29, T30, T32 and T34 and was achieved in 1948. It was to be "a heavy tank capable of heavy assault and breakthrough." In its final design it appeared to be a larger version of the T48 Medium.

With the beginning of the Korean War in 1950, production of the T43 was authorized. In the meantime testing continued and minor modifications resulted in the T43E1. These modifications were incorporated in production. The first production tank was completed in 1952 and all were completed by the end of 1954. The vehicle was standardized in October 1953 as the 120mm Gun Full-Track Combat Tank M103. Numerous defects were found to exist because an untested vehicle had been placed in production but it was considered that the existence of a state of war had justified the risk of taking such action. 200 were built.

Most of the defects were corrected by vehicle modifications made early in 1957. A subcommittee of the Committee on Government Operations of the House of Representatives in Congress held hearings on March 22, 1957 which were critical of the Army for the existence of these defects. But the Army position was that the tank had been available for combat and that the modifications made were actually only refinements and improvements in design.

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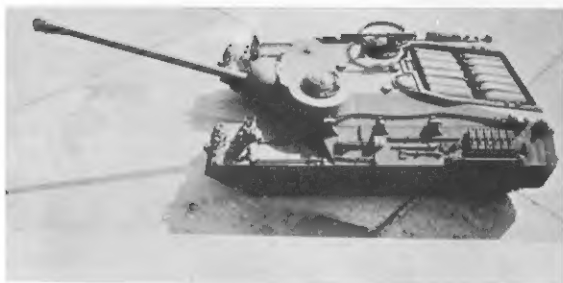
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1. T95 Gun Motor Carriage on the single tracks used on hard ground and for railway travel. Earlier and later designation was T28 Heavy Tank. (Courtesy G. B. Jarrett)

2. The extra tracks for the T28 Heavy Tank formed a trailer which could be towed by the tank and installed when needed. (Courtesy G. B. Jarrett)

3. Front view of the massive T95 Gun Motor Carriage with supplementary track set installed. (U.S. Ordnance Department)

4. Three quarter top view of the T95 Gun Motor Carriage showing stowage, louvers and ventilators. (Courtesy R. P. Hunnicutt)

5. T29 Heavy Tank, developed from the M26 Pershing, showing the standard tracks widened by the use of extended end connectors. (U.S. Ordnance Department)

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1. The T29E3 Heavy Tank had the turret modified in order to instal one of the first post-World War II tank gun rangefinders. (U.S. Ordnance Department)

2. The T30 Heavy Tank was armed with a 155mm gun using separate loading ammunition. (U.S. Ordnance Department)

3. The T32 Heavy Tank from the left rear shows the rear ventilating hood which was added to the turret. The T32 was improved from the M26. (U.S. Ordnance Department)

In the meantime, on March 15, 1957, the Commanding General of the U.S. 7th Army in Europe, at a conference at Fort Hood, Texas, outlined the requirements for employment of the M103 in Europe. These included the kinds of tests which should be undertaken to establish, not whether the vehicles were "acceptable", but rather whether they were "useable." He felt that it would be desirable to have the M103 in Europe to overwatch the M48 tanks and that the tests should determine whether the vehicle was capable of playing that rôle as well as whether it possessed adequate "reliability in retrograde operations." After tests it was believed that the M103 met the stated requirements and, except for a few taken over by the U.S. Marine Corps, the tanks were shipped to the 7th Army in Europe.

The initial modified vehicle was the T43E2 and the modified vehicles which followed became the M103A1. In it, a turret basket was installed and the ballistic drive in the M103 was replaced by a ballistic computer and a cant corrector.

In Europe it was found that the engine was underpowered, requiring replacement of engines and transmissions after average mileage distances of only about 500. The ammunition stowage was not convenient, repeated firing of AP ammunition caused excess chamber erosion, tracks were easily thrown, crew safety, comfort and ability to function were impaired by poor interior arrangement and the same compensating idler defect encountered on the M48 tanks was found to exist in this one. But although it was felt that the tank was sluggish it could do the job intended.

At the same time as the T43 was going into production, an unarmored crane on the same chassis was built as the T6 Heavy Wrecker, later modified as the T6E1. This led to the armored T51 Heavy Recovery Vehicle, in keeping with the general practice of providing an armored recovery vehicle in each vehicle team. Two prototypes were built and, after test, the vehicle was standardized as the M51. A production contract was awarded to Chrysler Corporation in April 1954 for a number of vehicles plus a quantity of spare parts. Production began in August 1954 and was completed the following year.

Except for a few which were undergoing test, all M51 vehicles were modified at Lima Tank Depot, beginning in October 1956, because of defects in engines, transmissions, booms and winches, at a cost of \$26,000 per vehicle. By June 1958, 177 vehicles had been modified and the ten remaining were scrapped. The M103 tanks had cost \$300,963 each while the M51 vehicles had cost about half that.

DESCRIPTION OF M103

The M103A1 was served by a crew of five, comprising commander, driver, gunner and two loaders. It weighed 62.5 short tons loaded and 58.5 tons empty. It had a speed of 21 mph but its 268 U.S. gallons of fuel were sufficient only for an 80 mile radius. The hull was a homogeneous armor casting with a welded armor plate floor and an armor plate bulkhead which separated the fighting compartment from the power plant compartment. On the top were a turret hatch, a driver's hatch, and top deck doors and louvers for access to the power plant. On the bottom were an escape hatch for the driver under his seat with access openings for drain valves and for the purpose

of making various mechanical adjustments. The turret also was of cast homogeneous armor except for a welded armor plate bustle floor.

The main armament consisted of a 120mm M58 (T123E1) L/60 gun having an elevation of -8° to $+15^{\circ}$ and a range of 5000 yards. Recoil was from 13 to 15 inches. The gun was in a combination mount M89 (T154) which had a coaxial .30 caliber machine-gun. The turret could be traversed through 360° either manually or electrically. Gun elevation and firing was also carried out either manually or electrically. Three fire control systems were provided: direct sighting through rangefinder and periscope sight, direct sighting through telescopic sight, and indirect sighting by means of azimuth indicator and gunner's quadrant. In using the first method, the computer received range data from the rangefinder. Ammunition data and required ballistic data were applied manually to the computer and the result transmitted to the gunner's periscopic sight through a swivel drive shaft to the super elevation transmitter and cant corrector and to a link assembly bar on the gun trunnions, the whole forming a variable solid parallelogram.

A .50 caliber machine-gun was provided on the turret. Separate loading ammunition was used and the ammunition available was:

AP-T Armor piercing tracer	WP White phosphorus smoke
HE High explosive	WP-T Smoke with tracer
HE-T High explosive tracer	TP-T Target practice with tracer

Ammunition stowage was 38 rounds for the main armament, 1000 rounds of .50 caliber and 5250 rounds of .30 caliber.

The engine was a Continental air-cooled V-12 AV 1790-5B, 7,7B or 7C. The transmission was the Allison CD 850-4, 4A or 4B which combined transmission, differential and brakes in one unit package and which permitted pivot turns. A 28-volt 300 ampere generator was driven by a one-cylinder air-cooled auxiliary gasoline engine. There was a ventilating blower at the left rear of the turret which kept powder fumes from entering the turret when the breech block opened after firing. Two gasoline heaters for use in winter were provided in the driver's compartment, one to his right and one to his left front. A fixed fire extinguisher was located in the engine compartment and was operable either by the driver or from the outside. A portable extinguisher was mounted on a bracket on the ammunition rack to the left of the commander's seat.

The usual stowage of tools and auxiliary equipment was provided on both inside and outside as well as the usual radios. Interphone equipment was provided as part of the communications system as well as a telephone headset with a 40 foot cable on a reel in a box at the rear of the hull. This was for the use of accompanying infantry or for the tank commander when directing fire from outside the vehicle.

The suspension was of the torsion bar type with seven double rubber-tired bogie or road wheels and six support rollers. Volute bumper springs were provided on the hull to limit the motion of the road wheels and there were spring-loaded shock absorbers on the three front and three rear road wheels on either side. The sprockets were in the rear and the front idlers were of the adjustable or compensating type. The tracks originally were steel chevron but were replaced on the T43E1 by the rubber chevron type.

The M103A1 (T43E2) was 37 feet 4½ inches long with

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1. The T34 Heavy Tank, seen here with turret reversed, was the T30 armed with a 120mm gun fitted with a bore evacuator and with the muzzle brake removed. (U.S. Ordnance Department)

2. The T43 Heavy Tank from three quarter left rear shows details of the suspension and the oddly swept up turret. (U.S. Army)

3. Rear view of the T43 equipped with jettison fuel kit, with engine louvers open and gun travel lock in use. (U.S. Ordnance Department)

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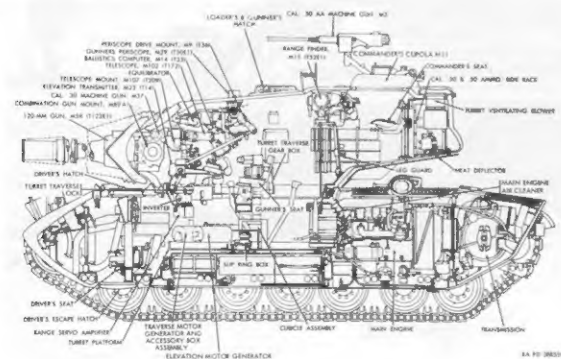
4. A T43 Heavy Tank mounted on its special low bed railway transport car. (U.S. Ordnance Department)

5. M103 Heavy Tank, with turret reversed, fitted with T18 dozer. (U.S. Ordnance Department)

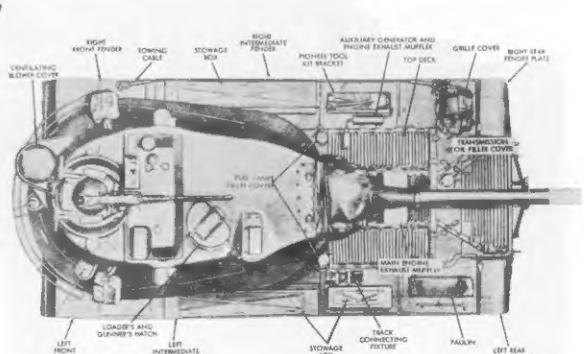
6. Cross section of the M103A1 Heavy Tank. (Department of the Army)

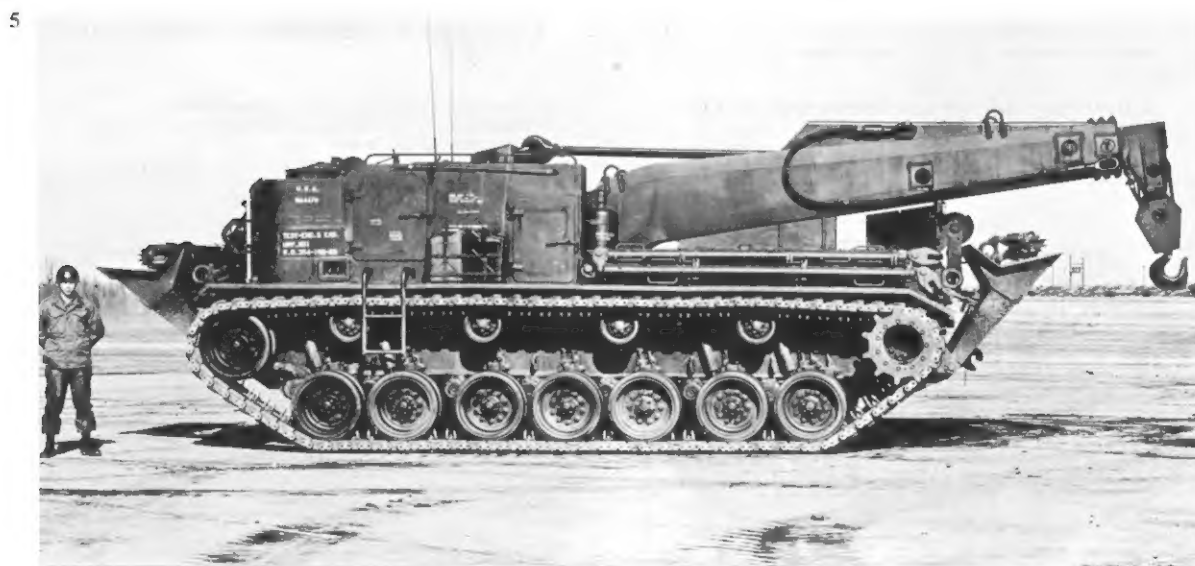
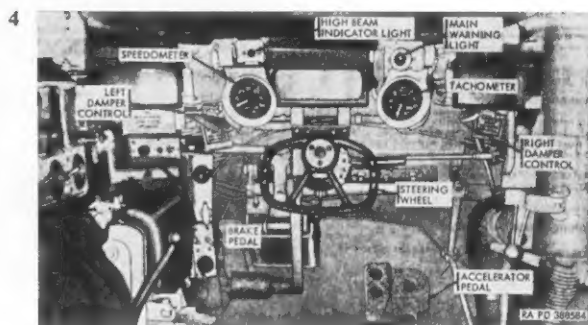
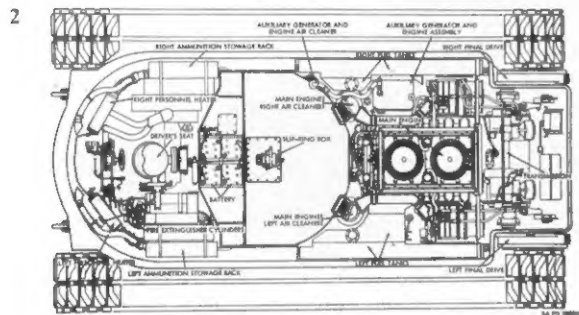
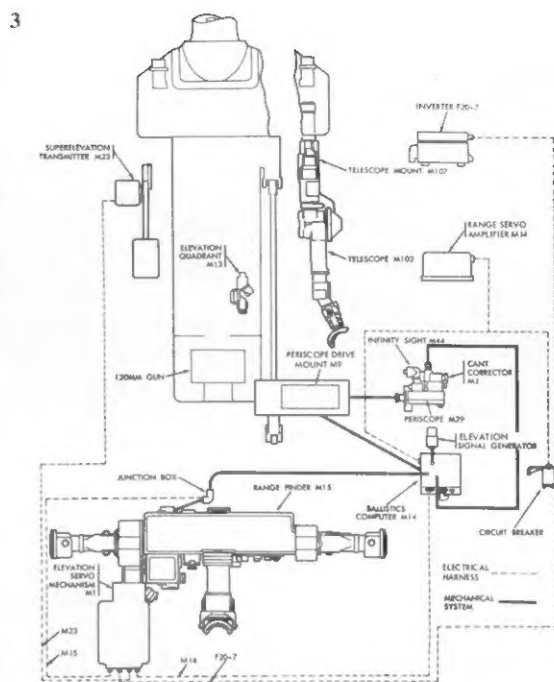
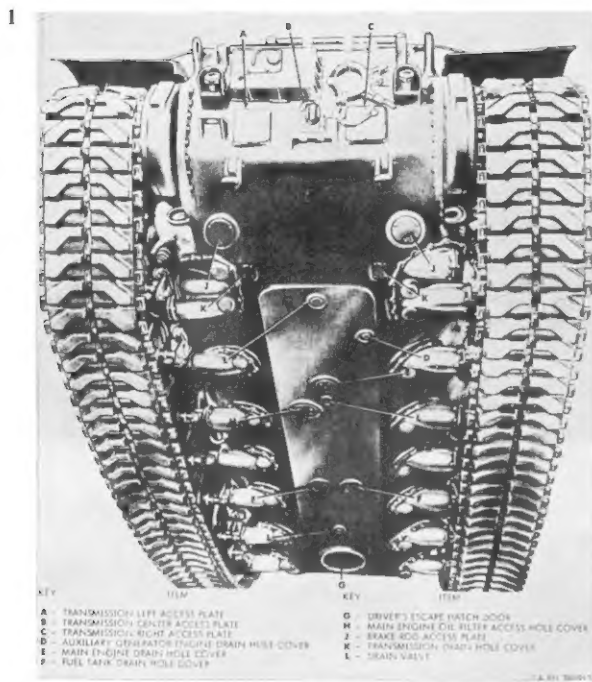
7. Top view of the M103A1 Heavy Tank with turret reversed showing the locations of various items of stowage. (Department of the Army)

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gun forward, 12 feet 4 inches wide and 11 feet 8 inches high overall or 9 feet 5 $\frac{3}{8}$ inches high without the machine-gun. Clearance was 15 $\frac{3}{8}$ inches. The turret ring was 7 feet 1 inch. Ground pressure was 12.8 psi. The vehicle could surmount a 60% slope, a 36 inch vertical obstacle and a 90 inch trench. Forging up to 4 feet was possible without preparation and 8 feet with it.

There was an M103A1E1 which had various improvements in the fire control system and increased fuel capacity. There was also an experiment in which M60 fire control and M60 engine and transmission were installed; this became the M103A2.

EXPERIMENTAL HEAVY TANKS

During the period when the M103 was undergoing tests and modifications, numerous other experimental heavy tanks were being designed and built in the United States. These were based on the experience gained with the M103 as well as on a knowledge of developments elsewhere.

The British Universal Tank and the Carnarvon of the late 1940s and the Conqueror of the early 1950s were known, as were the post-war French AMX 50 tanks with their oscillating turrets and the Russian T10. New ideas were generated and a whole new series of experimental heavy tanks appeared.

The U.S. T54 was a T48 Medium Tank chassis with six road wheels and five upper track rollers, mounting a 105mm gun in a T48 type turret having the early low cupola as used late in World War II. In the same series was the T54E1, similarly armed but in this version having an oscillating turret. The T54E2 was a 1956 modification of the T54 which substituted the later M48 type tank cupola.

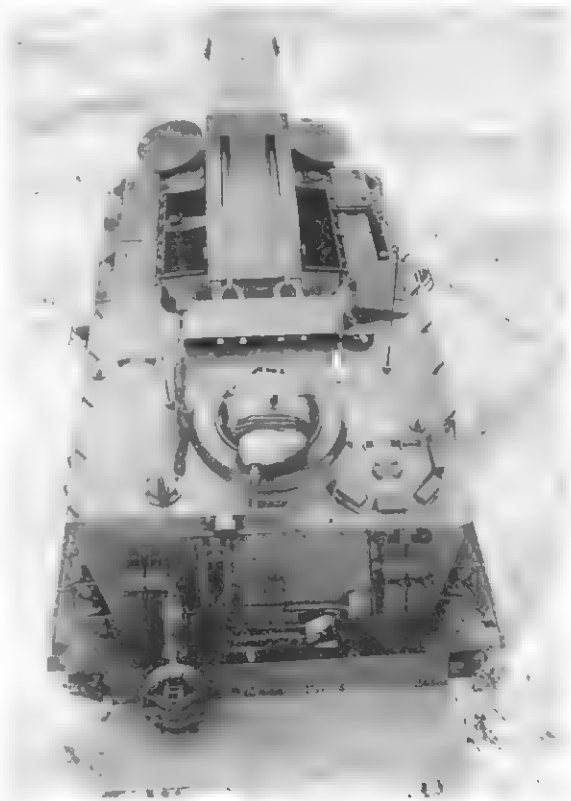
The T57 was the T32 Heavy Tank chassis with a 120mm gun in a torpedo shaped oscillating turret mounted on heavy outside hull-mounted trunnions. The T58 utilized a T43 Heavy Tank chassis. The turret resembled that of the M47 Medium Tank but was of the oscillating type and mounted a 155mm gun. The T58E1 was the same except that the turret was non-oscillating.

The T69 of 1955 was a T42 Medium Tank chassis with a 105mm gun and a rangefinder in an oscillating turret without cupola. There were also a T77 and a T110 Heavy Tank, each of which mounted a 120mm gun but both of these continue to be classified.

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1. This view of the M103A1 from the bottom rear shows the various openings and access plates as well as the torsion bar anchor housings. (Department of the Army)

2. Top view cross section of the M103A1 showing location of power pack and arrangement in the area of the driver (Department of the Army)

3. A schematic diagram of the primary fire control system in the M103A1 indicates the growing sophistication of such equipment (Department of the Army)

4. The driver's controls are compactly arranged in the M103A1 Heavy Tank (Department of the Army)

5. The M51 Heavy Recovery Vehicle based on the M103 Heavy Tank dwarfs the soldier standing beside it. (U.S. Ordnance Department)

6. The M51 Heavy Recovery Vehicle original commander's hatch was later replaced by the tank machine-gun cupola shown here. (U.S. Ordnance Department)

7. The T54E1 Heavy Tank with its 105mm gun in an oscillating turret in travel position, showing the open loader's hatch within a hatch. (U.S. Ordnance Department)

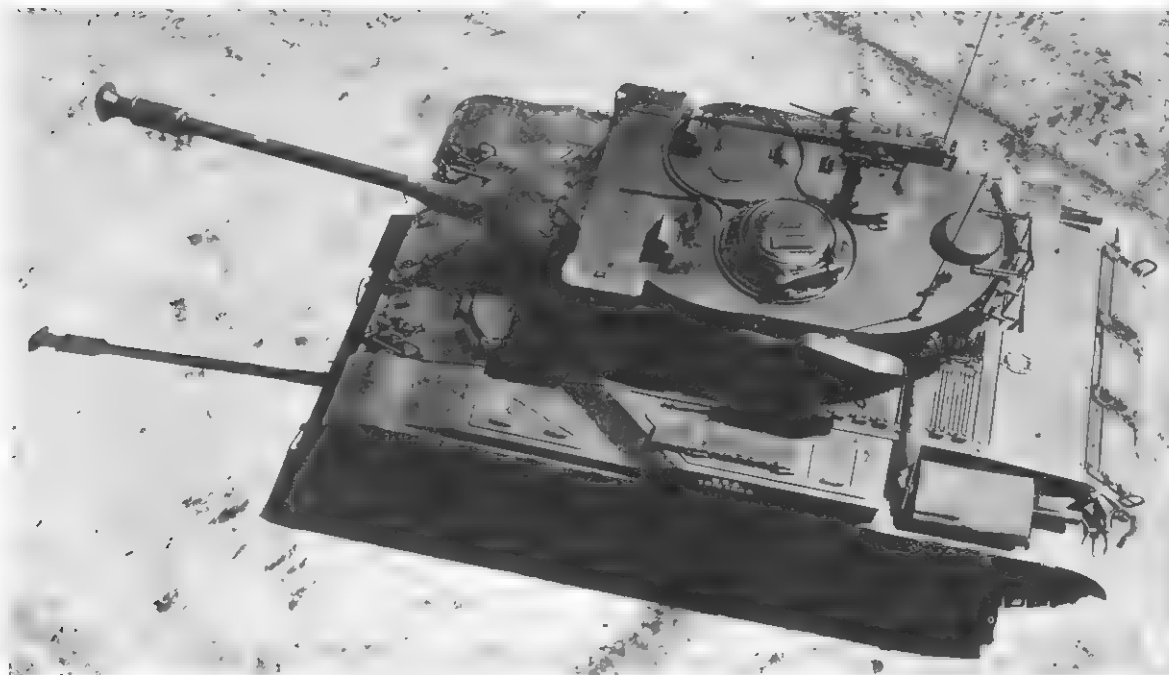
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1. The T37 Phase I was the first post-World War II light tank built in the United States. (U.S. Army)

2. Top view of the T37 Phase I tank shows the rangefinder housing, the turret hatches and the remote controlled machine-guns. (U.S. Ordnance Corps)

3. The T37 Phase II Light Tank, later renamed the T41 showed changes principally in the rangefinder housings which now were cast instead of welded. (U.S. Ordnance Corps)



The T41E1 surmounts a vertical obstacle while undergoing proving ground tests. (U.S. Ordnance Corps)

M41 Light Tank (Walker Bulldog)

by Robert J. Icks, Colonel A.U.S. Retd.

ALMOST immediately after V-J Day, while industry was getting back into commercial production, the U.S. Ordnance Department began a tank program embodying the lessons learned during the war. When the program was finalized, industry was invited early in 1948 to attend a symposium to determine how long it might take manufacturers to get into war production again should that prove necessary. Several firms were asked to undertake studies of new Ordnance-designed vehicles which embodied design simplification, ease of maintenance through greater accessibility, and greater interchangeability of parts.

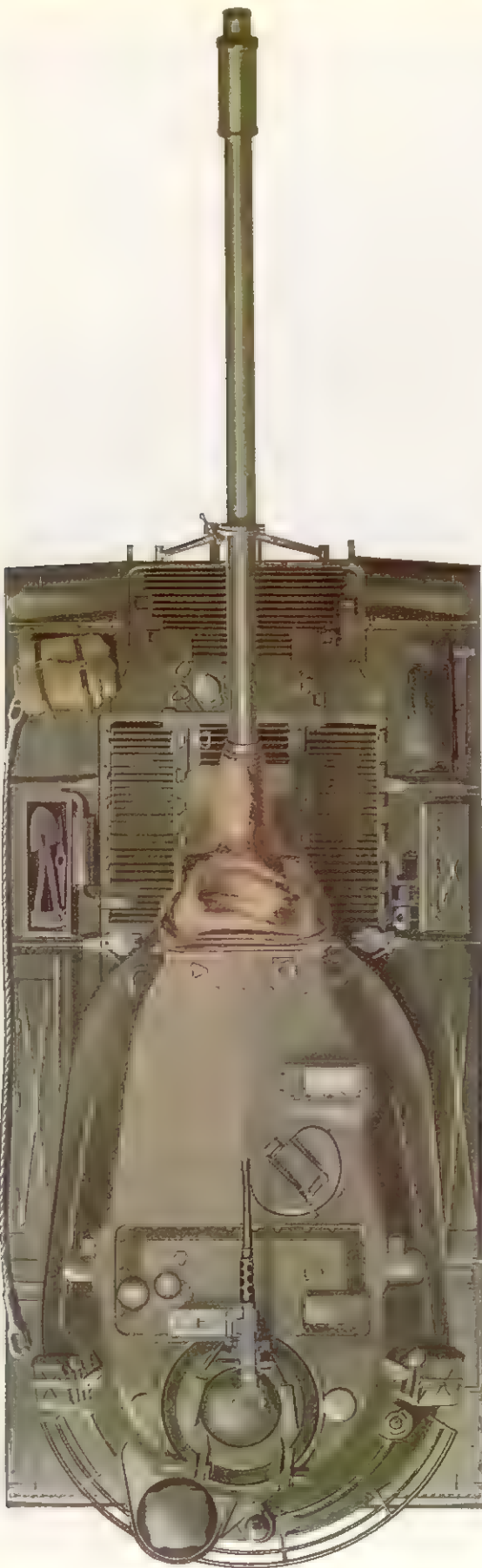
Although the M24 Chaffee was an excellent light tank, designers are never satisfied, so by 1949 an improved light tank prototype designated the T37 Phase I was built. It was a 24 short ton tank mounting a 76mm T94 gun which was about two feet longer than the 90mm tank gun of World War II. It had a co-axial .50 caliber machine-gun, another .50 caliber gun mounted on a pintle on the top of the turret and a remote-controlled .30 caliber machine-gun mounted on either side of the turret. This tank had a stereoscopic rangefinder with automatic lead computer and ballistic corrector, polaroid sights and power turret traverse. There was a

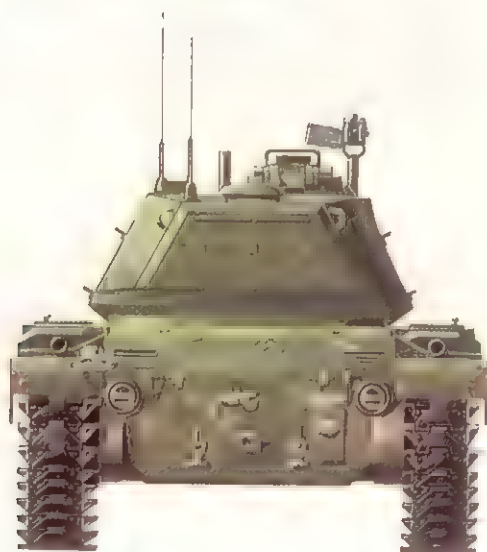
pronounced turret bulge or bustle and a rather high commander's vision cupola. Both turret and hull were of welded armor. Torsion bar suspension was used with five road wheels per side and the tracks were center guide steel chevron type with removable rubber pads having a life of some 4000 miles. There were three track support rollers, the forward two near together. A Continental boxer type engine of 500 hp was provided.

Another prototype tank of the same period was the T37 Phase II. In fact it was almost identical to the Phase I model but the turret was both welded and cast, the gun mantlet was changed, and the ammunition supply was considerably lowered. This was done because additional room was needed for changes in the fire control system. The rangefinder was changed to a superimposed coincidence type integrated with a Vickers stabilization system in both elevation and azimuth and an automatic lead computer. As a result, the vehicle was increased in weight by 1½ short tons. Later the T37 Phase II was designated the T41 Light Tank. There also was a T37 Phase III which differed in that it had a T91 automatic 76mm gun and an IBM stabilizer.

The pilot vehicles Light T41, Medium T42 and the Heavy T43 formed a team of vehicles intended for the

Top views of M103 Heavy Tank (left) and M41 Walker Bulldog Light Tank (right), both with their turrets reversed. Three basic designs emerged in the U.S. post-World War II tank programme. The M103 and the M41 resulted from two of them.



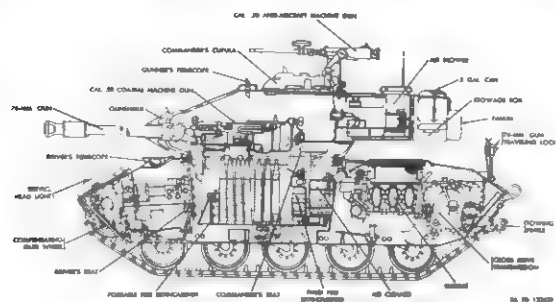


Three views of the M41 Light Tank. First called the Little Bulldog its name was changed to Walker Bulldog in honor of General W. W. Walker, who was killed in Korea in 1951.

1



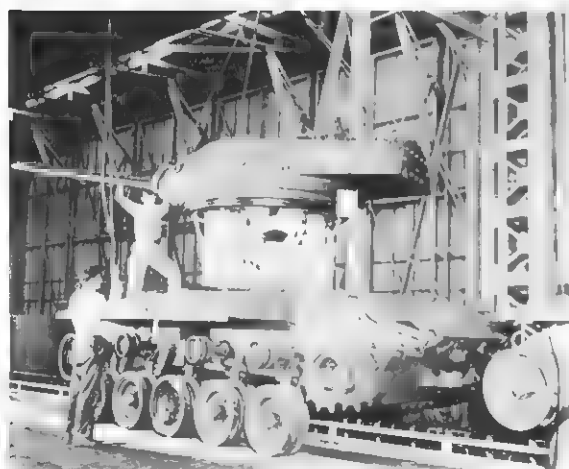
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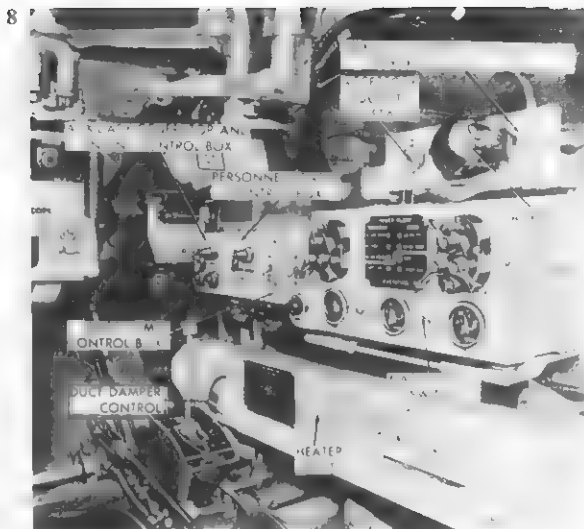
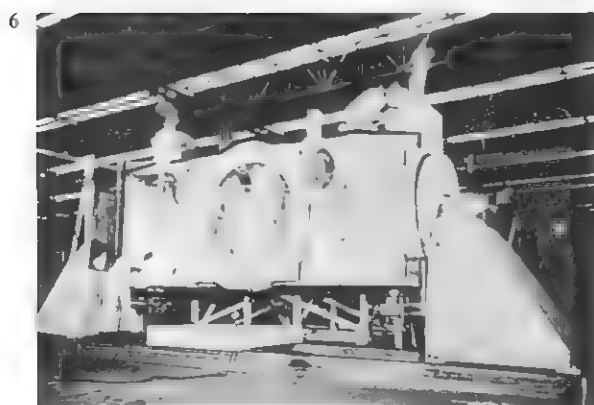
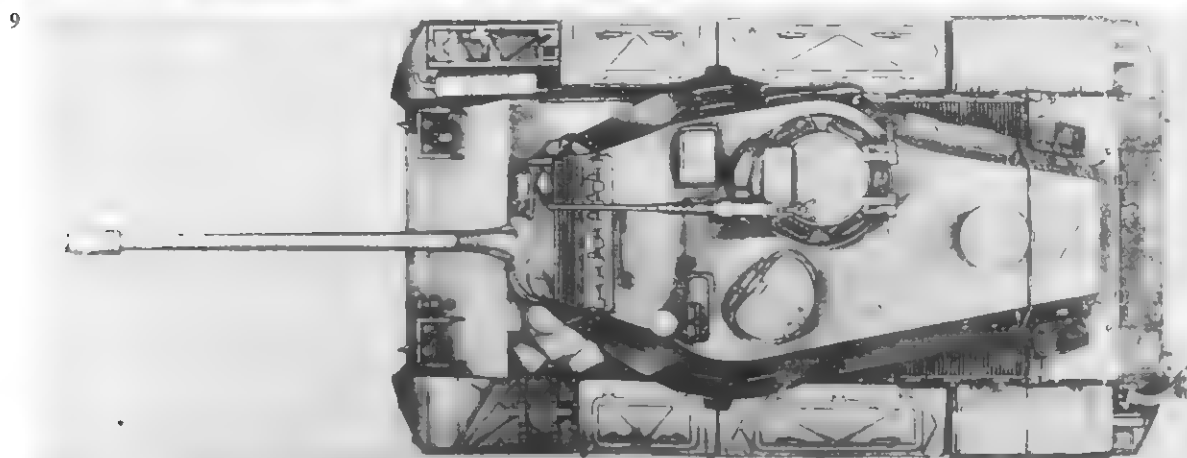
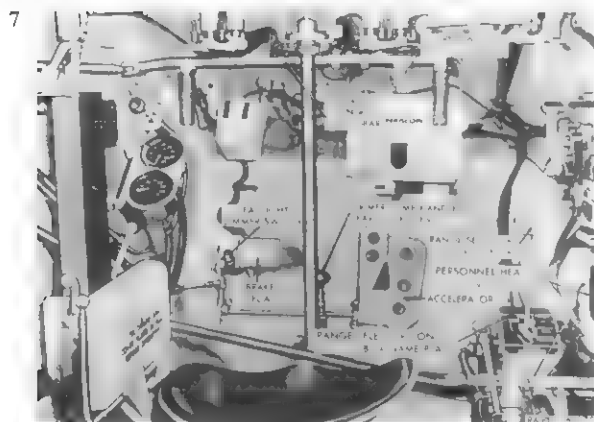
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4



1. A cutaway view of the T41 turret illustrates the gun breech, coaxial machine-gun and ammunition stowage. (U.S. Ordnance Corps)
2. Cross section drawing of the M41 showing location of the major components. (U.S. Ordnance Corps)
3. Top view of the T41E1 illustrates the changes made in the turret design and location and conformation of hatches (U.S. Ordnance Corps)
4. Installation of turret on an M41 tank at the Cleveland Tank Arsenal. Note that the vehicle rolls on road wheels during most of the assembly. (General Motors)



5. Details of M41 front bogie and idler wheels illustrating shock absorber, volute spring bumper stop, and eccentric for adjusting track tension. (General Motors)

6. Positioning fixture used for welding M41 hulls at the Cleveland Tank Arsenal. (General Motors)

7. M41 Light Tank driving controls, levers and pedals (Department of the Army)

8. M41 Light Tank auxiliary generator and engine, personnel heater, and bilge pump control boxes. (Department of the Army)

9. Top view of M41A1 Light Tank with 76mm gun in firing position (Department of the Army)

post-war period. Cadillac Motor Car Division of the General Motors Corporation was asked to consider producing a quantity of the T41 which had been modified still more and which was to be produced as the T41E1. Chrysler Corporation was asked to produce the T42 (which later was modified hurriedly because of the Korean War to become the M47 Medium) and the T43, destined to become the M103 Heavy Tank.

Cadillac was unable to undertake the production of the T41E1 in its existing plant in Detroit, so an entirely new facility had to be developed. Initially the design and tool engineering groups remained in Detroit but later were moved to Cleveland. At Cleveland there was a World War II Air Force plant which was obsolete because projected aircraft designs required longer runways than were available there. The plant had been sub-let after the war for the purpose of storing dried beans. This is the plant which became the Cleveland Tank Arsenal. The beans were removed to other storage facilities and the necessary modifications and installations of machine tools were made, starting in September 1950, urgency being lent by the start of the Korean War in June of that year. The plant was large enough so that a very modern arrangement conforming to material flow was possible.

During and after World War II, Ordnance had engaged in a program with industry to develop major components for tanks. Continental Motors had done considerable developmental work on a new series of aircooled engines. Allison Division of General Motors Corporation had done similar developmental work on transmissions for tanks. Other manufacturers had contributed in the same way on tracks, electrical units and auxiliary power plants.

Cadillac set up a procurement clinic which permitted suppliers to see a complete tank disassembled and the components displayed in such a way that production

engineers could quickly determine whether they would be interested in submitting bids. The tank had been made at Rock Island Arsenal.

In the end, over 600 main and 2300 subcontractors became involved in producing parts and components for the project. Cadillac also had to hire and train an eventual total of 6500 supervisors and workers beginning with only 55 men who had had previous experience in the wartime Detroit plant. There also had to be developed a follow-up organization to ensure deliveries of parts and sub-assemblies being made on time, another to write manuals and another to prepare parts lists, a facility for preserving and packaging spare parts and to make 33,000 corrugated paper boxes in 624 different sizes for the parts in order to package the specific quantity of spare parts which were called for to be stocked for each 100 tanks.

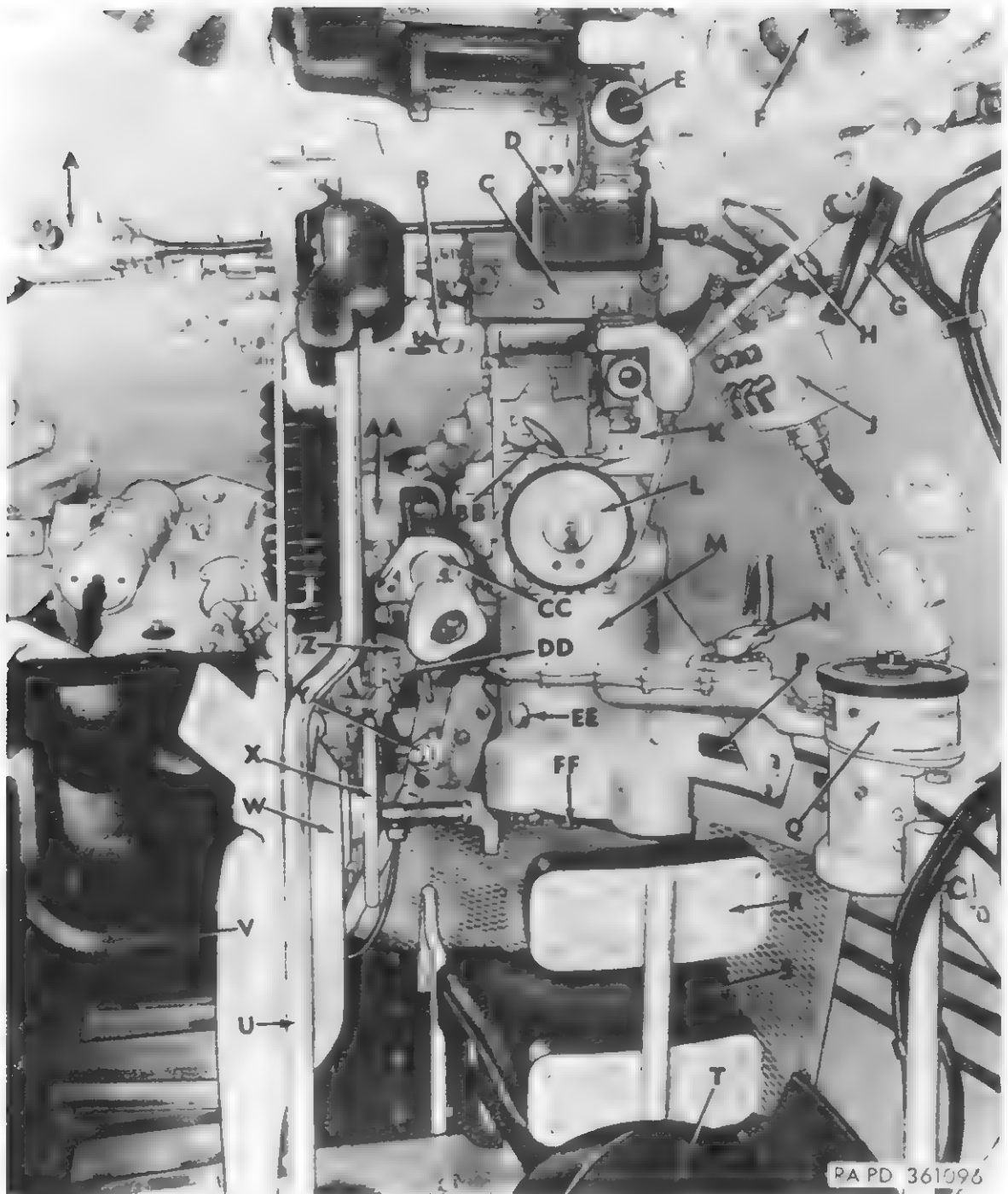
Cast armor was in short supply in the post-war period so welded armor was used to a greater extent than had been intended originally. Even though pilot vehicles were available, wooden mockups were made. In the production of the T41E1 (which became the M41) there were some 3½ million engineering releases and almost 5 million square feet of blueprint paper was used.

The production T41E1 had an elongated turret bustle and a new cupola as compared with the T37. The gunner's cupola was hinged at an angle. The rangefinder was brought inside and the previous commander's cupola was relocated on the right. The outside machine-guns were removed and a bore evacuator was provided for the gun.

Modified mudguards or fenders were used. The upper track roller arrangement was changed so that the two rear rollers were close together instead of the previous arrangement where the front two had been close to one another. Fender kits had been installed experimentally on this version as they were on so many post-war U.S.

The T41E2 which became the M41A1 had an improved turret which was both welded and cast. (Courtesy Cleveland Tank Arsenal)





PA PD 361096

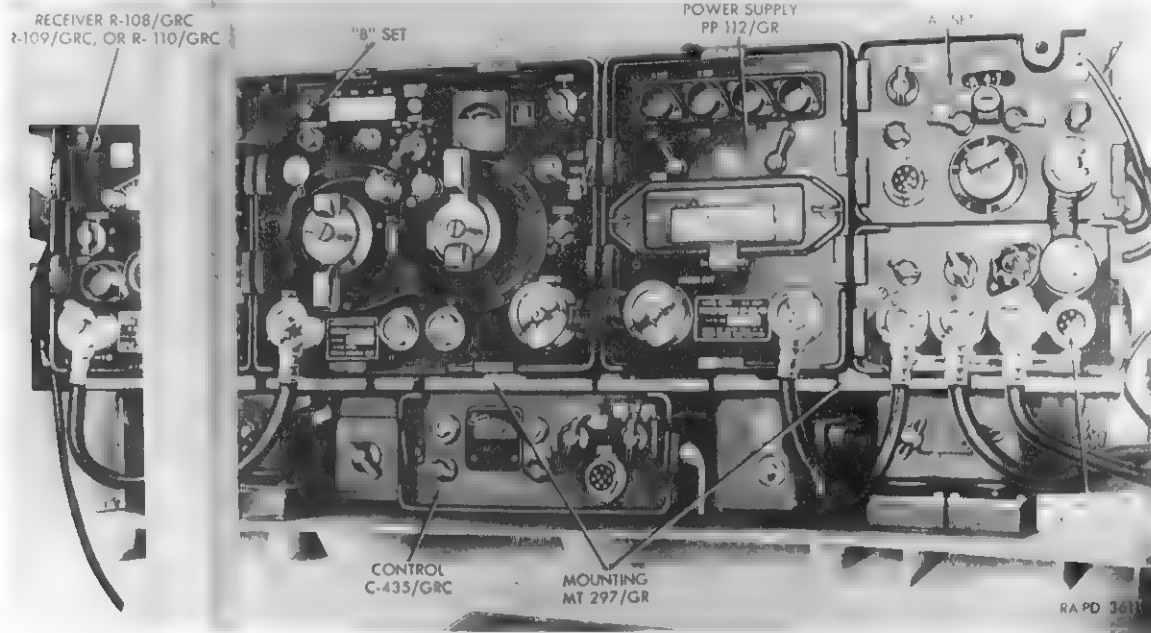
Turret interior M4 Sherman

- A Traversing electric motor switch
- B Dome light
- C Periscope mounting
- D Commander's periscope protective plate
- E Commander's periscope
- F Vision block
- G Commander's control handle
- H Control handle linkage
- J Commander's control box
- K Commander's electric control box
- L Traverse power traverse hardware
- M Traverse mechanism
- N Traverse hand drive assembly
- P Traverse pedestal mounting plate
- Q Armored seat
- R Gunner's seat backrest

- S Gunner's seat
- T Commander's seat
- U Commander's seat frame
- V Ammunition brace
- W Traverse mechanism
- X Gunner's control handle
- Y Telescope mounting
- Z Telescope mount
- AA Telescope mounting bracket assembly
- BB Telescope mounting bracket
- CC Telescope
- DD Telescope mounting bracket
- EE Telescope mounting bracket
- FF Telescope mounting bracket
- GG Telescope mounting bracket
- HH Telescope mounting bracket
- II Telescope mounting bracket
- JJ Telescope mounting bracket

(Department of the Army)

1



1. Radio set installation in M41A1 Light Tank
(Department of the Army)

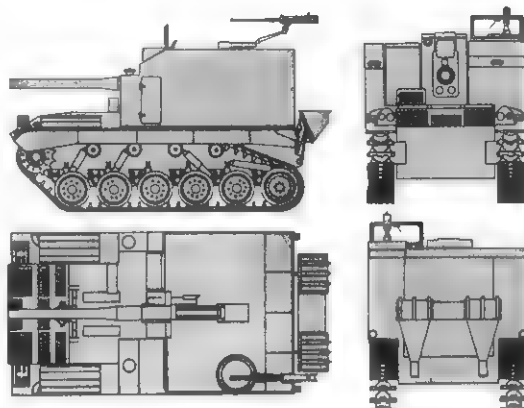
2. Four views of M41 Light Tank. ("Soldat und Technik")

3. Four views of M42 Self-Propelled Gun Twin 40mm gun
on M41 chassis, known as Duster. ("Soldat und Technik")

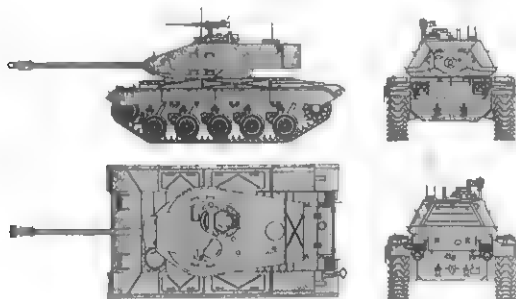
4. M44 155mm Self-Propelled Howitzer had M41
components. ("Soldat und Technik")

5. M52 105mm Self-Propelled Howitzer had M41
components ("Soldat und Technik")

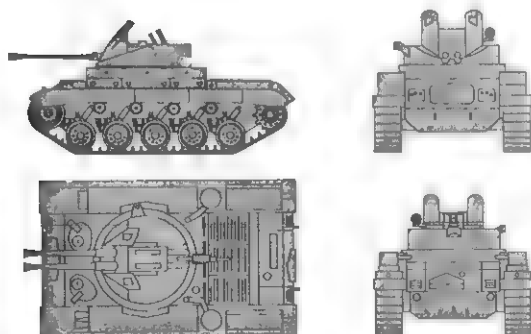
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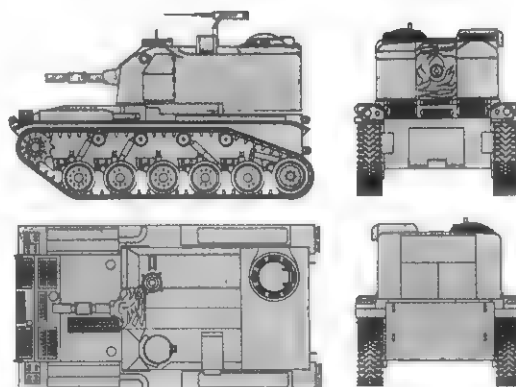
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5



tanks because the concept of remote-controlled driver-operated machine-guns died hard. Shock absorbers were used on all but the center road wheels and a single pin track which was almost impossible to throw was used.

The T41E1 was standardized in 1950 as the M41 and 1000 were authorized. In keeping with the practice of assigning nicknames the name Little Bulldog was adopted. This was changed to Walker Bulldog in honor of General W. W. Walker who was killed in a jeep accident in Korea in 1951.

DESCRIPTION OF M41 WALKER BULLDOG

The M41 was the first U.S. tank to be built around a power plant. Previously tanks had been designed and then an engine of the proper horsepower was sought to fit into it. The M41 also was the first U.S. light tank to have a bore evacuator, an integral fire control system and an automatic loader to select, lift, index, ram and catch the empty, returning it to its proper rack in the magazine—but this was later eliminated.

There are three compartments in the M41, the driver's, the fighting compartment, and the engine compartment, the last named separated by a fire bulkhead. A crew of four is carried. The driver is in front, the gunner and commander are on the right of the turret with the gunner in front, and the loader is on the left. The commander has five vision blocks and a periscope in the cupola. Ready rounds are in front of the loader's seat and on the sides of the turret. There are also hull racks for ammunition but to remove them the gun must be traversed to the rear in travelling position. A total of 57 rounds is carried, 11 ready, 13 in the turret and 33 in the hull. A collapsible spent cartridge bin is located under the gun breech.

A safety switch prevents the gun from being fired while the loader is behind the breech and another safety switch prevents turret movement while ammunition is being removed from the hull racks. The firing switch for the gun is located on the gunner's elevating handwheel.

The differences between the M41 and the M41A1 are principally in the turret traversing and gun elevating mechanisms. Vehicles Nos. 1-1802 were M41 and Nos. 1803 and above were M41A1. Some of the earlier vehicles were later modified to the M41A1 standards. The elevating mechanism for the gun is hydraulic in the M41 and mechanical in the M41A1. The traversing mechanism in the M41A1 is more compact and simple.

The gun is the 76mm M32(T91E3) with blast deflector. It has -10° to $+20^{\circ}$ elevation and 360° traverse. The turret revolves at 4 rpm. The gun mount is the M76 (T138E1) and M76A1 (T138E2) in the M41 and M41A1 respectively because of the differing gun elevating mechanisms.

The following types of ammunition are available; the kinds and proportions of each depending on the particular mission:

HE	High Explosive
AP-T	Armor piercing, tracer
HVAP-T	Hyper velocity armor piercing, tracer
HVAP-DS-T	Same with discarding sabot
WP	White phosphorus smoke
TP-T	Target practice, tracer
HVTP-T	Hyper velocity target practice, tracer
Blank	
Canister	

A ballistic drive interconnects the ballistic unit, periscope and telescopic sights by means of linkage to the

gun trunnions. Various settings permit the insertion of projectile type and other data to make the necessary corrections for firing direct fire. An azimuth indicator and gunner's quadrant also are available for indirect fire.

The power plant is a complete unit. The 6-cylinder boxer type engine operates through a cross drive which means that the transmission and steering mechanisms are a unit. An auxiliary generator and engine are mounted in the right front corner of the engine compartment. It is used to recharge batteries and to act as an engine compartment heater. A ventilating blower, gasoline-operated personnel heater and bilge pumps all are controlled from the driver's instrument panel to the right of the driver. The vehicle can operate in temperatures from -65° to $+125^{\circ}$ F. There are four drain valves in the floor to drain water, oil and fuel spillage. Bilge pumps are installed only in vehicles up to No. 262 but mounting pads were included in all vehicles in case installation of bilge pumps was needed for a given operation. The customary fire extinguisher was located in the engine compartment with pulls both inside and outside the vehicle in addition to a portable extinguisher available in the crew compartment.

There are adjustable seats except for the loader. The escape hatch is located below the driver's seat. Dome lights with red and blue lenses are provided for both driver and turret. The outside service lights are normal plus blackout type.

These tanks have torsion bar suspension. The tracks are steel open type with 74 shoes per track on the early models and 75 on the late models. A compensating wheel is attached to the adjacent front road wheel by a swinging arm and link. The final drive is in the rear.

Early vehicles through No. 1299 had an antenna base near the right rear of the top of the turret and two more on the left side. Later production vehicles had all three along the left side. The radios may be of several types and are installed according to mission. Interphones are provided as well as an auxiliary telephone. This last is for communication between the tank crew and infantry. An armored door at the rear provides access to this telephone.

The M41 was tested with jettison fuel tanks but this was not adopted as standard. One experiment involved the mounting of a launcher kit comprising a spray of six smoke launchers placed on top of the gun mantlet, one on either side of the turret and one at the rear of the turret bustle. One vehicle also was tested with a special turret carrying an early Shillelegh which previously had been tested only on a Sherman. This modification was the forerunner of the design of the XM 551, later to become known as the Sheridan or M551 Light Reconnaissance Vehicle.

Further modifications produced the T41E2 which became the M41A1. The M41A2 and M41A3 displayed further modification, the last named being equipped with the IR Xenon light.

OTHER VEHICLES WITH M41 CHASSIS

Not only was the M41 issued as a tank but the chassis became the basis for a considerable number of other vehicles. These included the following:

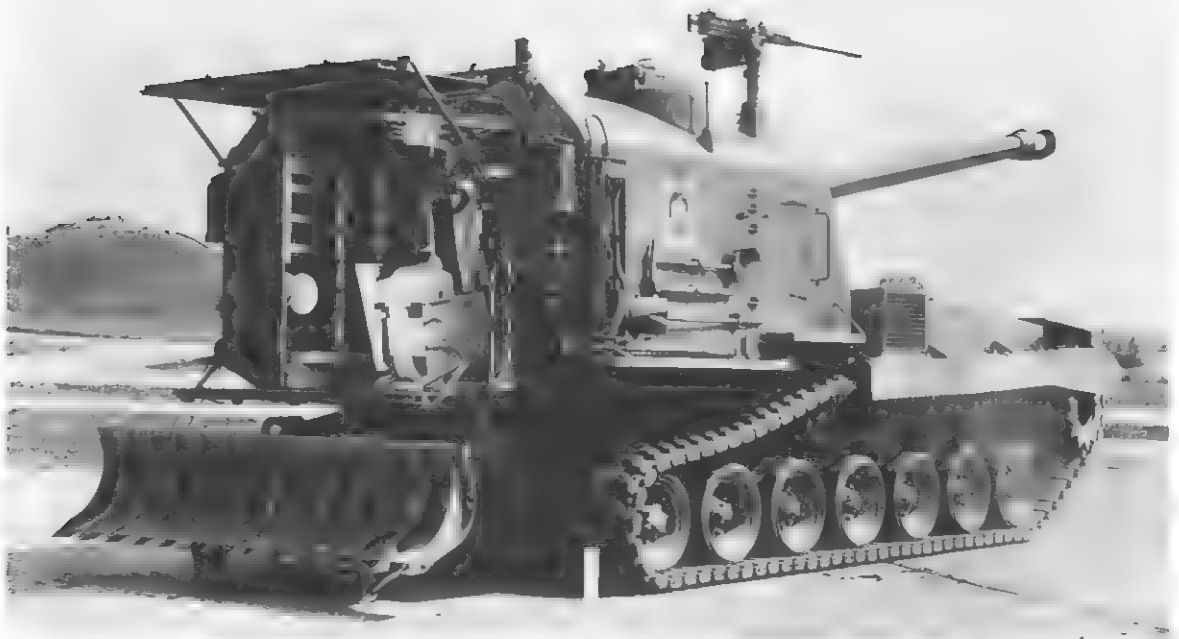
T18 Self-Propelled Mount, a 75mm AA gun rear mounted and without an armored superstructure.

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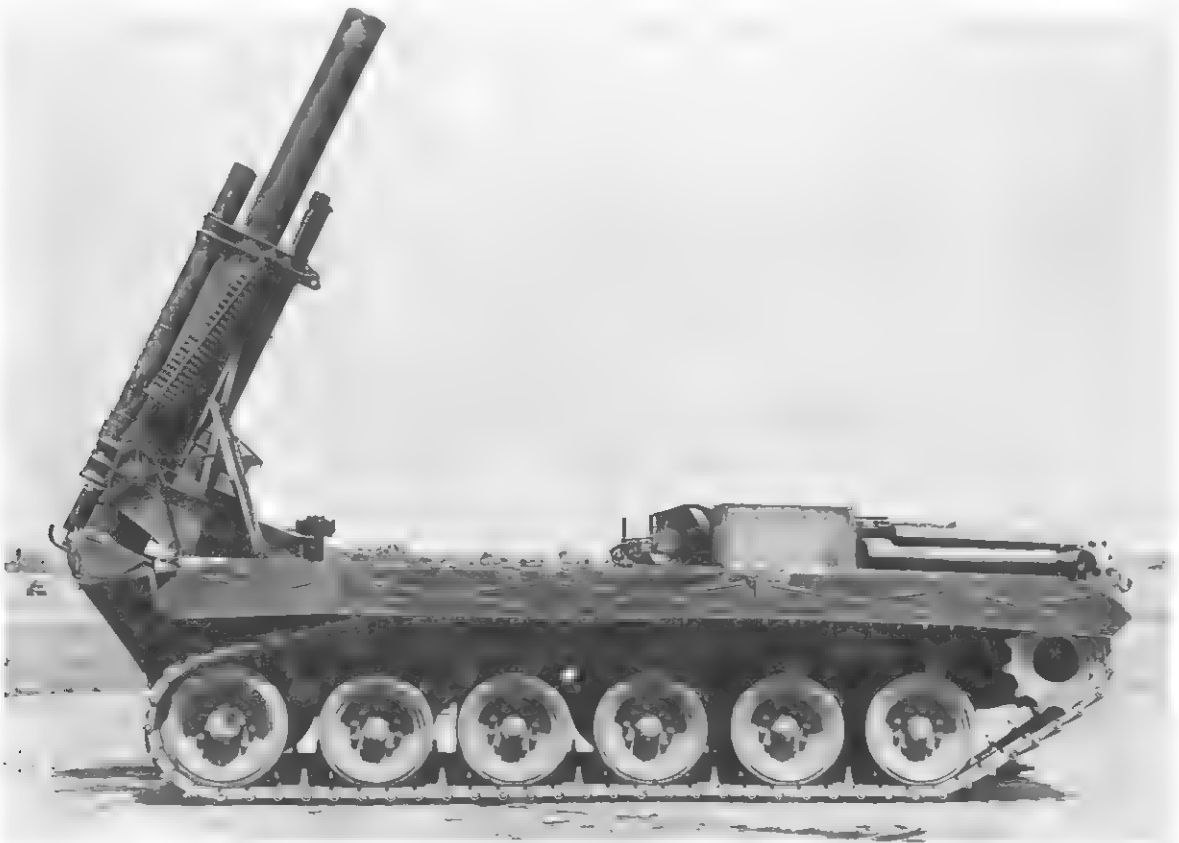


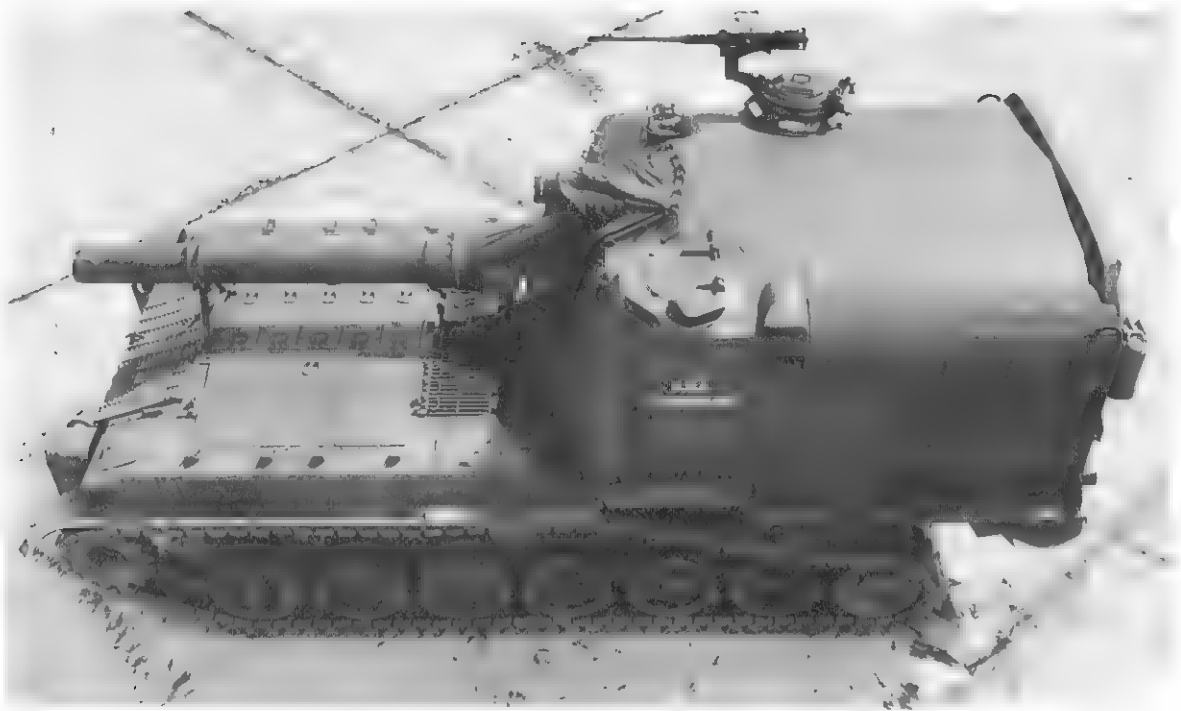
1. M42A1 Duster mounting twin 40mm Bofors gun found considerable use in South Viet Nam for perimeter defense (Courtesy J. W. Loop)

2. The M52, built on a modified M41 chassis mounted a 105mm howitzer in a rotating turret (U.S. Ordnance Corps)

3. The 155mm Gun Motor Carriage T97, which became the M53, from the right rear showing the massive rotating turret (U.S. Ordnance Corps)

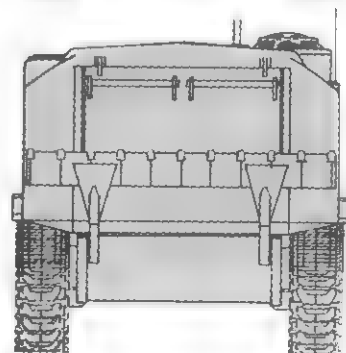
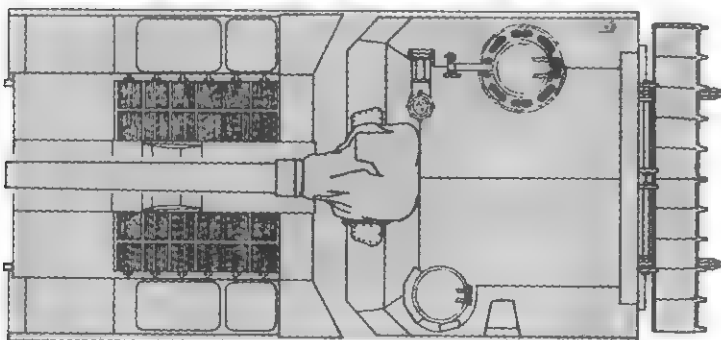
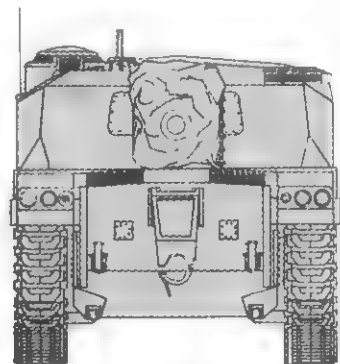
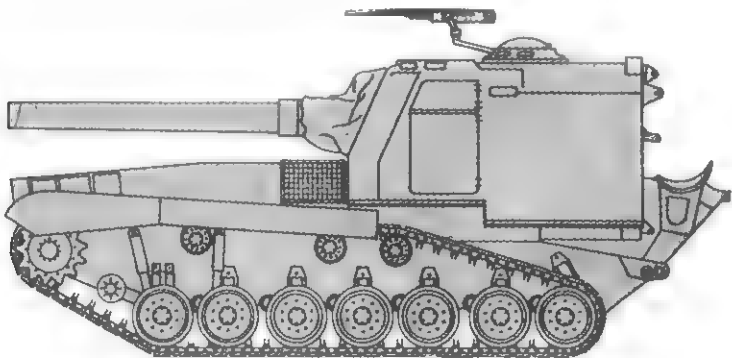
4. The T99 austerity mount formed a cheap, quickly produced 155mm Howitzer Motor Carriage on a modified M41 chassis. (U.S. Ordnance Corps)





Top view of the 8-inch Howitzer Motor Carriage M55E1 illustrates the chassis common to the M53, also built with M41 Light Tank components. (U.S. Ordnance Corps)

M55 8-inch Self-Propelled Howitzer had M41 components ("Soldat und Technik")



T141 Twin 40mm Self-Propelled Mount, intended as a replacement for the M19 which was based on the Light Tank M24 chassis. In the T141 the gun was center mounted rather than rear mounted. It became the M42 or Duster. A later M42A1 had improved computer sights.

T99 Self-Propelled Mount, sometimes called Austerity Mount. It had a 155mm howitzer rear mounted. Like the T18 it had no armored superstructure.

T100 Self-Propelled Mount, had four Oerlikon 20mm guns with radar in a special turret.

Components of the M41 were also used in a number of other vehicles. These included the following:

155mm Self-Propelled Howitzer T194 which became the M44 and the later M44A1.

105mm Self-Propelled Howitzer T98 and T98E1 which later became the M52 and M52A1.

155mm Self-Propelled Howitzer T99E1.

8-inch Self-Propelled Howitzer which later became the M55 and M55E1.

155mm Self-Propelled Gun T97 which became the M53.

Other vehicles on the M41 chassis or which utilized M41 components were the T73 and M75 Armored Personnel Carriers, the T43E1 Cargo Carrier and finally the T49 Light Tank. This last was an experimental M41 in which the turret was made somewhat higher in order to make possible the mounting of a special 90mm gun. A still later design was the T71 Light Tank but it never got beyond the wooden mockup stage.

Vehicles of the M41 family were furnished to a number of foreign countries including at least the following:

Austria, M41, M42, M52

Belgium, M41, M44, M55

Brazil, M41

China (Taiwan), M41

Denmark, M41

France, M41, M44

Germany (West), M41, M44, M52, M55

Great Britain, M44

Greece, M41

Israel, M44 (by capture)

Italy, M41, M44, M53, M55

Japan, M41

Jordan, M44, M52

Lebanon, M41

Pakistan, M41

Philippines, M41

Saudi Arabia, M41

Spain, M41, M44, M52

Thailand, M41

Tunisia, M41

Viet Nam (South), M41

A few M41 vehicles as well as the self-propelled guns on the same chassis have seen combat in Viet Nam and in the Middle East.

TECHNICAL SPECIFICATION

The general characteristics of the M41 are as follows:

Crew: Four

Length (hull): 229 $\frac{3}{4}$ in.

(gun rear): 279 $\frac{1}{2}$ in.

(gun front): 323 $\frac{1}{2}$ in.

Width 125 $\frac{1}{2}$ in.

Height (overall): 121 $\frac{1}{2}$ in.

(vehicle): 107 $\frac{1}{2}$ in.

Weight (loaded): 51,800 pounds

Clearance: 17 $\frac{1}{2}$ in.

Ground Pressure: 10.2 p.s.i.

Armor: Turret front, 25 plus 15mm,

side 25mm. at 30°

Hull front 30mm. at 40°

sides 25mm. at 40°

rear 20mm. at 40°

Electrical system: 24 volts

Fuel: 140 U.S. gallons

Transmission: CD 500-3 Cross drive

Engine: Continental or Lycoming AOS 895-3

Type: Boxer 6-cylinder

HP: 500 at 2800 r.p.m.

Slope: 60%

Turning radius: Pivot

Ford: 40 in.

Wall: 28 in.

Trench: 72 in.

Radius: 100 miles

Speed: 45 m.p.h.

Armament (main): 76mm. M32 in Combination Mount M76

(other): .50 cal. and .30 cal. machine-guns

Ammunition: 57/630/5000 rounds of 76mm., .50 caliber and .30 caliber

Tracks: 21 in. wide, 5 $\frac{1}{2}$ in. pitch, 74 or 75 shoes per side

Traverse: Manual and power

Bogie wheels: 5

Rollers: 3

Auxiliary engine: GM A41-1

The engine in the M41A1 is the AOSI-895-5 and this engine also is used in the M41A2. It is of the fuel injection type.

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Walker Bulldog, Its Design and Production, EDWARD M. COLE

and HAROLD G. WARNER, *Cleveland Tank Plant, October 1951*

TM 9-2350-201-12 (Formerly TM 9-730) Operator's and

Organizational Maintenance 76mm Gun Full Tracked Combat

Tank M41 (T41E1) and M41A1 (T41E2), *HQ Department of*

the Army, July 1958

A.F.V. Series Editor: DUNCAN CROW

The T49 Light Tank with its modified M41 turret represented an effort to upgun to 90mm. (Courtesy Dan Smith)





Rear view of the M41A1 showing the stowage box extending the already long turret bustle. (U.S. Army)

*Controlled mud at the Cleveland Tank Arsenal proving ground provided ample testing of M41 Light Tank engine and transmission.
(Courtesy Cadillac Motor Car Company)*



AFV/Weapons Profiles

Edited by DUNCAN CROW

FORTHCOMING TITLES:

42 Modern Swedish Light Armoured Vehicles

Included in this *Profile* are the Pbv 302 armoured personnel carrier and its derivatives – the Bgbv 82 recovery vehicle, the ingenious Broby 941 bridgelayer and the IKV 91 infantry gun intended for operation in the north of Sweden, the Noorland: BY R. M. OGORKIEWICZ, author of *Design and Development of Fighting Vehicles and Armoured Forces*, and of *AFV/Weapons Profiles 28, 34 and 39*.

43 PanzerKampfswagen IV

While the Panther and Tiger have tended to capture the limelight, it was in fact the PanzerKampfswagen III and IV which established the reputation of the German armoured forces. The Panzer IV, whose first prototype was built in 1934, eventually became the only German tank which remained in production and troop service throughout World War II, a fact which demonstrates its sound basic design and the brilliant foresight shown in its specification. It was still in service in the Syrian Army as late as 1967. BY WALTER SPIELBERGER. (An expanded Armour in Profile).

44 Ferret and Fox Scout and Reconnaissance Cars

Ferrets, developed from the Second World War experience with the Daimler scout cars, have become some of the world's most widely used armoured vehicles. Thus, they are in service not only with the British Army, but also with the armed forces of more than twenty different countries. The successful experience with them has, in turn, led to the even more effective Fox armoured car (or Combat Vehicle, Reconnaissance, Wheeled). This has aluminium armour and much more powerful armament but otherwise retains many of the characteristics of the Ferrets: BY R. M. OGORKIEWICZ.

45 Vickers 37-ton Main Battle Tank

Called by the Indian Army "Vijayanta" (Freedom) this Main Battle Tank (the latest in half a century of tank design and tank production) was built by Vickers to meet an Indian request for a tank to replace the Centurion as India's standard battle tank. It incorporates the Chieftain power pack, gearbox, steering unit and brakes, and is now also being built in India: BY R. M. OGORKIEWICZ.

46 Light Tanks M22 (Locust) and M24 (Chaffee)

In appearance rather like a miniature Sherman, the M22, called by the British the Locust, was designed as an airborne tank for the U.S. Army in World War II. But none were used in action by the Americans. The British, however, included some in the Rhine crossing operations of 6th Airborne Division in XVIII U.S. Airborne Corps. The M24 (Chaffee) though classified as a light tank was equivalent to the early British cruisers in weight and superior to them in armament. Though the Chaffee came in at the tail end of WWII, its days of glory were in Korea where it had to withstand the onslaught of North Korea's Russian T34/85s at the beginning of that war. It was still on active service in the Indo-Pakistan war in December 1971: BY COLONEL ROBERT J. ICKS. (M22 is new, M24 is a revised Armour in Profile.)

47 T-34

The development of the Russian T-34 tank and the discomfiture and surprise of the German Army in finding its panzers outclassed by the T-34/76 ("the best tank in any army up to 1943" in Guderian's judgment) are described BY J. M. BRERETON. In the second half of this *Profile* a description of the even more powerful T-34/85 with its increased firepower, and a critique of the T-34 in service, are given BY MAJOR MICHAEL NORMAN, Royal Tank Regiment. (T34/76 is a revised Armour in Profile, T-34/85 is new).

48 PanzerKampfswagen VI - Tiger I and II

49 Japanese Medium Tanks by Lieut.-General Tomio Hara, Imperial Japanese Army, Retd.

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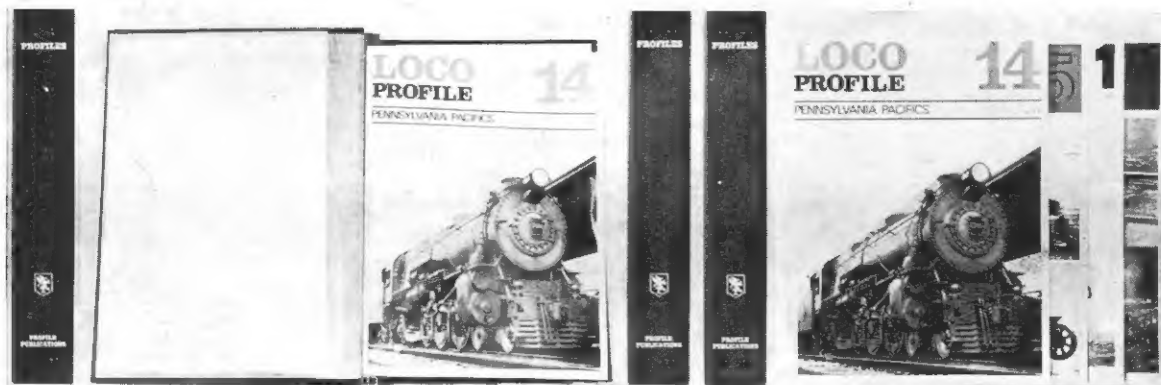
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